510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE

A. 510(k) Number:

k041928

B. Purpose for Submission:

Clearance of new device

C. Measurand:

High Density Lipoprotein (HDL)

D. Type of Test:

Quantitative Colorimetric Assay

E. Applicant:

Diagnostic Chemicals Limited

F. Proprietary and Established Names:

HDL-Advance Assay

G. Regulatory Information:

1. Regulation section:
   21 CFR §862.1475, Lipoprotein test system

2. Classification:
   Class I, meets limitations of exemptions, 21 CFR 862.9 (c)(4)

3. Product code:
   LBS

4. Panel:
   Clinical Chemistry (75)

H. Intended Use:

1. Intended use(s):

   For the quantitative determination of high density lipoprotein fractions of cholesterol in serum.

A lipoprotein test system is a device intended to measure lipoprotein in serum. High Density Lipoprotein (HDL) cholesterol measurements are used in the diagnosis and treatment of lipid disorders (such as diabetes mellitus), atherosclerosis, and various liver and renal diseases.

2. Indication(s) for use:

   Lipoprotein measurements are used in the diagnosis and treatment of lipid disorders (such as diabetes mellitus), atherosclerosis, and various liver and renal diseases.

3. Special conditions for use statement(s):

   This assay has not been tested or certified by the CRMLN.

   For in vitro diagnostic use.

   For professional use only.

4. Special instrument requirements:

   Hitachi 717 and 917 Analyzers

I. Device Description:

The HDL-Advance Assay contains two wet reagents and an assay calibrator (for information on the calibrator, see k041926).

J. Substantial Equivalence Information:

1. Predicate device name(s):
   Roche HDL-C Plus 2nd Generation

2. Predicate 510(k) number(s):
   k033610

3. Comparison with predicate:

   The device and its predicate share the same intended use and reaction principle. There are no major differences between the device and its predicate in design, or function.

K. Standard/Guidance Document Referenced (if applicable):

NCCLS Guideline EP5, Evaluation of Precision performance of Clinical Chemistry Devices

NCCLS Guideline EP6, Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach
NCCLS Guideline EP-7, Interference testing in Clinical Chemistry

L. Test Principle:

The serum sample is mixed with the two reagents, and the lipoproteins other than HDL are removed by selective inhibition. The HDL cholesterol in the sample initiates the following reaction [HDAOS = N(2-hydroxy-3-sulfopropyl)-3,5-dimethylaniline]:

$$\text{LDL-Cholesterol} \xrightarrow[\text{Cholesterol esterase}]{} \text{Cholesterol + fatty acid}$$

$$\text{Cholesterol} + O_2 \xrightarrow[\text{Cholesterol Oxidase}]{} \Delta 4\text{-Cholestenon} + H_2O_2$$

$$2H_2O_2 + \text{4-amino-antipyrine + HDAOS} \xrightarrow[\text{Peroxidase}]{} \text{Quinone pigment} + 4H_2O$$

The color intensity produced by the reaction is measured spectrophotometrically at 600 nm and is directly proportional to the concentration of LDL cholesterol in the sample.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:
   a. Precision/Reproducibility:

The imprecision of the device was evaluated according to NCCLS guideline EP5-A. Three levels material were assayed in duplicate twice per day for 20 dys (total n = 80). Results are summarized below (units = mg/dL):

		Within run		**Between run**		**Total**	
	Mean	**SD**	**% CV**	**SD**	**% CV**	**SD**	**% CV**
Level 1	44.292	0.549	1.2 %	1.569	3.3 %	1.702	3.6 %
Level 2	58.791	0.576	1.0 %	2.421	4.1 %	2.513	4.3 %
Level 3	86.655	1.465	1.6 %	1.058	1.2 %	2.236	2.5 %

b. Linearity/assay reportable range:

The reportable range of the assay is 1-180 mg/dL (0.03 – 4.66 mmol/L).

Linearity was evaluated by spiking a human serum pool with under-reconstituted control material and making serial dilutions with saline to achieve the following theoretical concentrations: 231.1, 208.0, 184.9, 161.8, 138.7, 115.6, 92.4, 69.3, 46.2, 23.1, and 0.0

mg/dL. The theoretical concentration was compared to the observed concentration and the following least squares regression statistics were observed: Observed = 0.974(Theoretical) + 1.67. The device is linear from the lower limit of detection (0.119 mg/dL) to 180 mg/dL.

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

For information on the included calibrator, please see k041926.

d. Detection limit:

The analytical sensitivity was determined by adding three standard deviations to the mean of 10 replicate measurements of saline. This value was determined to be 0.119 mg/dL.

e. Analytical specificity:

The assay was evaluated for potential interference from hemoglobin, bilirubin, and lipemia. Hemoglobin up to 1000 mg/dL and bilirubin up to 40 mg/dL caused < 10% interference. Intralipid levels up to 1000 mg/dL (equivalent to triglyceride levels up to 3000 mg/dL) caused < 10% interference.

The sponsor provides references to common drug interferences in clinical chemistry tests.

f. Assay cut-off:
Not applicable

2. Comparison studies:
   a. Method comparison with predicate device:

Fifty patient serum samples were assayed using the device and the predicate assay. The results were compared and the resulting Deming and Least squares regression statistics are as follows (units = mg/dL):

Least Squares: (Device) = 0.994(Predicate) + 1.79
R = 0.9987
Slope (95% CI): 0.994 (0.980 – 1.009)
Intercept (95% CI): 1.79 (0.93 – 2.66)
Std Err Est: 1.28

Deming: (Device) = 0.996(Predicate) + 1.73
Slope (95% CI): 0.996 (0.981 – 1.010)
Intercept (95% CI): 1.73 (0.86 – 2.60)
Std Err Est: 1.28

b. Matrix comparison: Not applicable

3. Clinical studies:
   a. *Clinical Sensitivity:*
      Not applicable

   b. *Clinical specificity:*
      Not applicable

   c. Other clinical supportive data (when a. and b. are not applicable):
      Not applicable

4. Clinical cut-off:
   Not applicable

5. Expected values/Reference range:

The sponsor cites the National Cholesterol Education Program Adult treatment Panel III for the following reference ranges:

	Desirable	**High Risk for CHD**
HDL Cholesterol (mg/dL)	> 60	≤ 40

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.